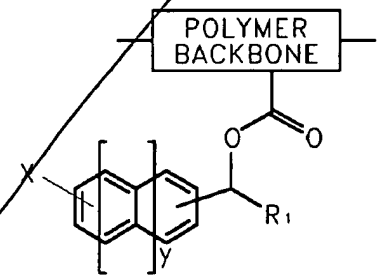
What is claimed is:

1. A photosensitive polymer having an acid-labile protecting group represented by the formula:



wherein the acid-labile protecting group comprises a fused aromatic ring; R_1 is hydrogen atom or alkyl group having from 1 to 4 carbon atoms; X is hydrogen atom, halogen, alkyl, or alkoxy; and *y* is an integer from 1 to 3.

2. The photosensitive polymer of claim 1, wherein the acid-labile protecting group is bound to a polymer backbone of the photosensitive polymer.

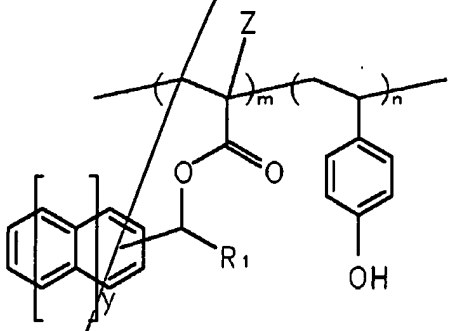
3. The photosensitive polymer of claim 2, wherein the polymer backbone of the photosensitive polymer comprises acrylate backbone, methacrylate backbone and norbornene backbone.

4. The photosensitive polymer of claim 1, wherein the fused aromatic ring is a liner ring or branched ring with *y* greater than or equal to 2.

5. The photosensitive polymer of claim 1, wherein the photosensitive polymer has a weight average molecular weight ranging from about 3,000 to about 200,000.

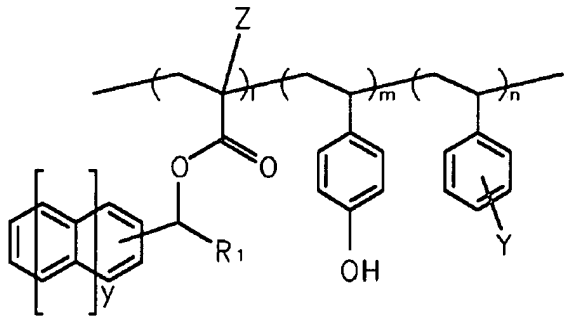
6. The photosensitive polymer of claim 4, wherein the photosensitive polymer has a weight average molecular weight ranging from about 10,000 to about 50,000.

7. The photosensitive polymer of claim 1, wherein the photosensitive polymer has the formula:



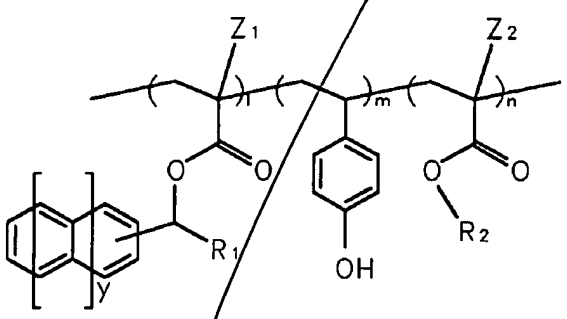
wherein Z is hydrogen atom or methyl group; the ratio of m/(m+n) ranges from 0.05 to 0.4; and the photosensitive polymer has a weight average molecular weight ranging from about 3,000 to about 50,000.

8. The photosensitive polymer of claim 1, wherein the photosensitive polymer has the formula:



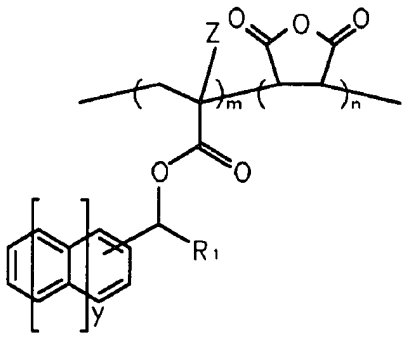
wherein Y is hydrogen atom, alkyl, alkoxy, or tert-butoxycarbonyloxyl group; Z is hydrogen atom or methyl; the ratio of l/(l+m+n) ranges from 0.05 to 0.4; the ratio of n/(l+m+n) ranges from 0.1 to 0.3; and the photosensitive polymer has a weight average molecular weight ranging from about 3,000 to about 50,000.

9. The photosensitive polymer of claim 1, wherein the photosensitive polymer has the formula:



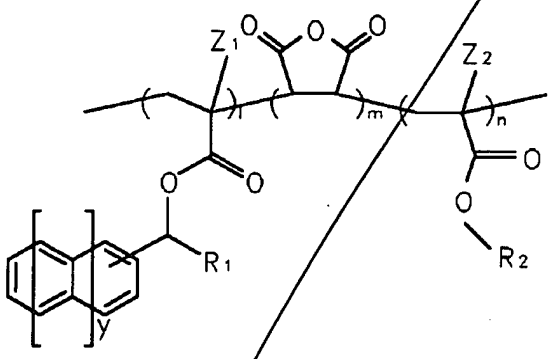
wherein R_2 is hydrogen atom, methyl, ethyl, or tert-butyl group; Z_1 is hydrogen atom or methyl group; Z_2 is hydrogen atom or methyl group; the ratio of l/(l+m+n) ranges from 0.05 to 0.4; and the ratio of n/(l+m+n) ranges from 0.1 to 0.3; and the photosensitive polymer has a weight average molecular weight ranging from about 3,000 to about 50,000.

10. The photosensitive polymer of claim 1, wherein the photosensitive polymer has the formula:



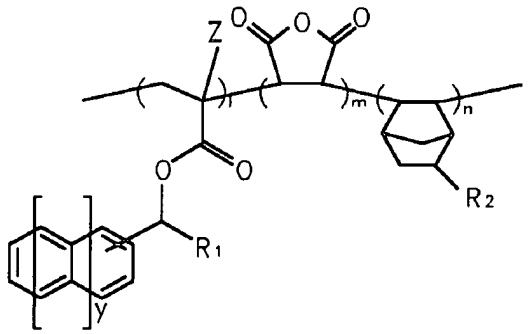
wherein Z is hydrogen atom or methyl group; the ratio of m/(m+n) ranges from 0.5 to 0.7; and the ratio of n/(m+n) ranges from 0.3 to 0.5; and the photosensitive polymer has a weight average molecular weight ranging from about 3,000 to about 50,000.

11. The photosensitive polymer of claim 1, wherein the photosensitive polymer has the formula:



wherein R_2 is hydrogen atom, methyl, ethyl, or tert-butyl group; Z_1 is hydrogen atom or methyl group; Z_2 is hydrogen atom or methyl group; the ratio of l/(l+m+n) ranges from 0.3 to 0.6; the ratio of m/(l+m+n) ranges from 0.3 to 0.5; and the ratio of n/(l+m+n) ranges from 0.1 to 0.4; and the photosensitive polymer has a weight average molecular weight ranging from about 3,000 to about 50,000.

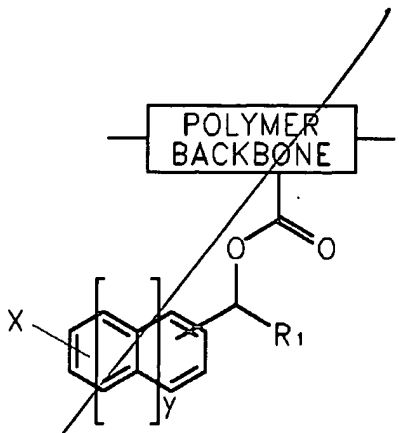
12. The photosensitive polymer of claim 1, wherein the photosensitive polymer has the formula:



wherein R_2 is hydrogen atom, hydroxyl, carboxyl, or tert-butyl ester group; Z is hydrogen atom or methyl group; the ratio of l/(l+m+n) ranges from 0.3 to 0.6; the ratio of m/(l+m+n) ranges from 0.3 to 0.5; the ratio of n/(l+m+n) ranges from 0.1 to 0.4; and the photosensitive polymer has a weight average molecular weight ranging from about 3,000 to about 50,000.

13. A photoresist composition comprising:

(a) A photosensitive polymer having an acid-labile protecting group represented by the formula:



wherein the acid-labile protecting group comprises a fused aromatic ring; R_1 is hydrogen atom or alkyl group having from 1 to 4 carbon atoms; X is hydrogen atom, halogen, alkyl, or alkoxy; and *y* is an integer from 1 to 3; and

(b) a photoacid generator (PAG).

14. The photoresist composition of claim 13, wherein the acid-labile protecting group is bound to the backbone of the photosensitive polymer.

15. The photoresist composition of claim 13, wherein the fused aromatic ring is a liner ring or branched ring with *y* greater than or equal to 2.

16. The photoresist composition of claim 13, wherein the photoresist composition comprises from about 0.5 to about 10 weight percent of the photoacid generator based on the weight of the photosensitive polymer.

17. The photoresist composition of claim 13, wherein the photoacid generator is selected from the group consisting of triarylsulfonium salt, diaryliodonium salt, sulfonate, and a mixtures thereof.

18. The photoresist composition of claim 13, further comprising an organic base.

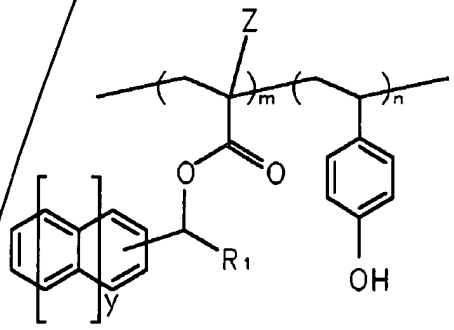
19. The photoresist composition of claim 18, wherein the organic base comprises from about 0.5 to about 50 weight percent based on the weight of the photoacid generator.

20. The photoresist composition of claim 19, wherein the organic base is selected from the tertiary amine group consisting of triethylamine, triethanolamine, triisobutylamine, triisooctylamine, triisodecylamine, and mixtures thereof.

21. The photosensitive composition of claim 12, wherein the photosensitive polymer has a weight average molecular weight ranging from about 3,000 to about 200,000.

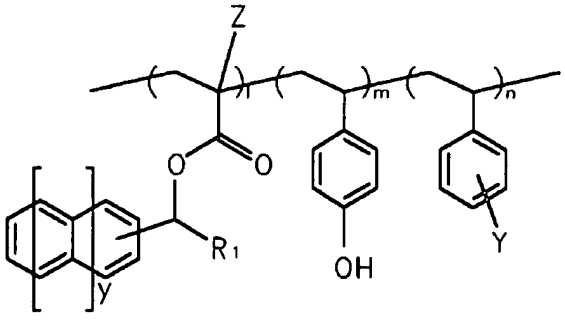
22. The photosensitive composition of claim 12, wherein the photosensitive polymer is selected from the group consisting of:

(a) a photosensitive polymer having the formula:



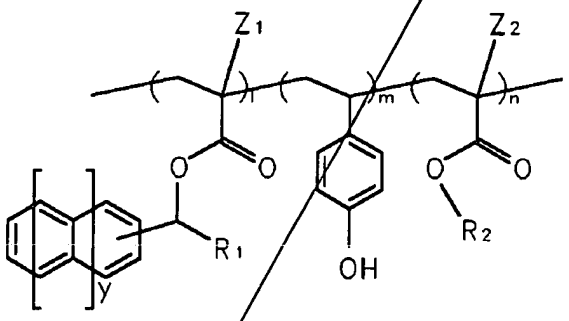
wherein *y* is an integer from 1 to 3; Z is hydrogen atom or methyl group; the ratio m/(m+n) ranges from 0.05 to 0.4; and the photosensitive polymer has a weight average molecular weight ranging from about 3,000 to about 50,000;

(b) a photosensitive polymer having the formula:



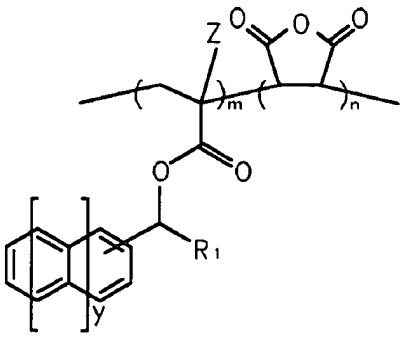
wherein Y is hydrogen atom, alkyl, alkoxy, or tert-butoxycarbonyloxyl group; *y* is an integer from 1 to 3; Z is hydrogen atom or methyl; the ratio of l/(l+m+n) ranges from 0.05 to 0.4; the ratio of n/(l+m+n) ranges from 0.1 to 0.3; and the photosensitive polymer has a weight average molecular weight ranging from about 3,000 to about 50,000;

(c) a photosensitive polymer having the formula:



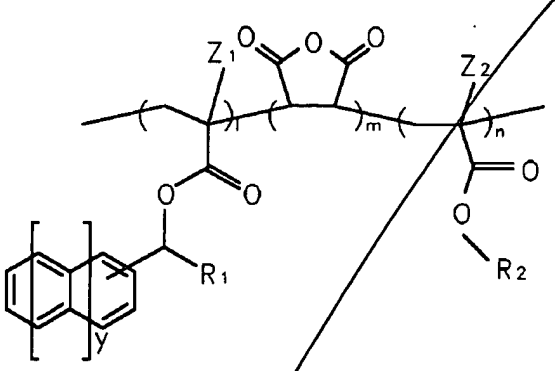
wherein R_2 is hydrogen atom, methyl, ethyl, or tert-butyl group; *y* is an integer from 1 to 3; Z_1 is hydrogen atom or methyl group; Z_2 is hydrogen atom or methyl group; the ratio of l/(l+m+n) ranges from 0.05 to 0.4; and the ratio of n/(l+m+n) ranges from 0.1 to 0.3; and the photosensitive polymer has a weight average molecular weight ranging from about 3,000 to about 50,000;

(d) a photosensitive polymer having the formula:



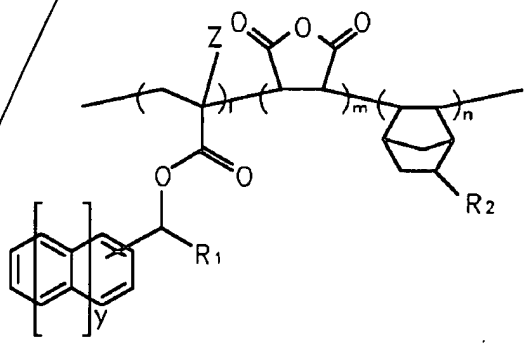
wherein *y* is an integer from 1 to 3; Z is hydrogen atom or methyl group; the ratio of m/(m+n) ranges from 0.5 to 0.7; and the ratio of n/(m+n) ranges from 0.3 to 0.5; and the photosensitive polymer has a weight average molecular weight ranging from about 3,000 to about 50,000;

(e) a photosensitive polymer having the formula:



wherein R_2 is hydrogen atom, methyl, ethyl, or tert-butyl group; *y* is an integer from 1 to 3; Z_1 is hydrogen atom or methyl group; Z_2 is hydrogen atom or methyl group; the ration of l/(l+m+n) ranges from 0.3 to 0.6; the ratio of m/(l+m+n) ranges from 0.3 to 0.5; and the ratio of n/(l+m+n) ranges from 0.1 to 0.4; and the photosensitive polymer has a weight average molecular weight ranging from about 3,000 to about 50,000; and

(f) a photosensitive polymer having the formula:



wherein R_2 is hydrogen atom, hydroxyl, carboxyl, or tert-butyl ester group; *y* is an integer from 1 to 3; Z is hydrogen atom or methyl group; the ratio of l/(l+m+n) ranges from 0.3 to 0.6; the ratio of m/(l+m+n) ranges from 0.3 to 0.5; the ratio of n/(l+m+n) ranges from 0.1 to 0.4; and the photosensitive polymer has a weight average molecular weight ranging from about 3,000 to about 50,000.

23. The photosensitive composition of claim 21, further comprising a photoacid generator, wherein the photoacid generator is selected from the group

consisting of triarylsulfonium salt, diaryliodonium salt, sulfonate, and mixtures thereof.

24. The photosensitive composition of claim 22, further comprising an organic base, wherein the organic base comprises from about 0.5 to about 50 weight percent based on the weight of the photoacid generator.